SHORT PAPER

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Facing up to bias in healthcare: The influence of familiarity appearance on hiring decisions

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Abstract

Associations between facial appearance and hiring decisions are well-documented within job literature as a source of decision misjudgment with economic and human costs. Notwithstanding, this aspect is yet to be investigated in healthcare. We collected 90 pictures of new-graduates nurses faces to be judged on different facial appearance-based traits by an independent sample. Six months after graduation, the same new-graduates were interviewed about their job situation. Binomial logistic regression was conducted to examine whether facial appearance ratings would predict the probability to be hired as nurse. Results showed that applicants with a face conveying a feeling of familiarity were more likely to be hired. Considering that people might be inclined to these biases during societal crises and the exceptional need to quickly recruit health professionals during COVID-19 pandemic, our study recommends special attention to prevent the influence of facial appearance-based evaluations not reflecting real skills to limit potentially adverse consequences.

KEYWORDS
facial appearance, familiarity, first impression, healthcare, hiring decisions

1 | INTRODUCTION

The recruitment of competent and skilled personnel can help to ensure that a company reaches its goals. Several evaluation criteria are used to judge the quality of potential workers and hiring organizations are usually interested in collecting as much reliable information as possible about job applicants (Breaugh, 2008; Dose, 2003; Tsai, Chi, Huang, & Hsu, 2011). However, it has been shown that job recruitment could be influenced by the natural propensity to form impression from simply the candidates' appearance (Little & Roberts, 2012; Luxen & Van De Vijver, 2006; Tsai, Huang, & Yu, 2012). There is a growing body of literature that recognizes the role of first impression based on facial appearance in hiring decisions across different working contexts. This is not surprising, considering

that outcomes of important social decisions may depend on superficial, appearance-based inferences of an individual's personality, abilities and intentions (Todorov, Olivola, Dotsch, & Mende-Siedlecki, 2015). Particular facial features are more likely to be associated with positive personality traits and, therefore, with more friendly behaviors and favorable consequences. Different traits are important in different domains, and several studies showed that the predictive power of a particular facial trait depends on its relevance to the domain in question (Todorov et al., 2015). For example, inferences of competence from faces have been proved to be a good predictor of political elections results (Ballew & Todorov, 2007; Todorov, Mandisodza, Goren, & Hall, 2005), while inferences of trustworthiness have been demonstrated to influence court outcomes (Porter, ten Brinke, & Gustaw, 2010; Wilson & Rule, 2015) or healthcare decisions

(Bagnis et al., 2020; Hadjistavropoulos, Ross, & Von Baeyer, 1990; Hall, Ruben, & Swatantra, 2020; Mattarozzi, Colonnello, De Gioia, & Todorov, 2017; Schäfer, Prkachin, Kaseweter, & Williams, 2016).

Similarly, facial appearance-based judgments also apply in the workplace, as previous studies have demonstrated that positive inferences from facial appearance predict outcomes for the workers itself (e.g., career promotions) and for the companies (e.g., higher profits). For example, CEOs whose faces signal more competence and dominance are more expected to work in companies earning higher profits (Rule & Ambady, 2008; Rule & Tskhay, 2014), while trustworthy-looking individuals are more likely to be selected as CEOs successors (Gomulya, Wong, Ormiston, & Boeker, 2017), to get higher managerial pay awards (Fruhen, Watkins, & Jones, 2015) and to reach a higher position within a corporate hierarchy (Linke, Saribay, & Kleisner, 2016). Although there is a good agreement between individuals about the extent to which a face signals stable dispositions, these inferences generally have poor validity, meaning that face-based impression is an important source of bias (Todorov et al., 2015).

Hiring or promoting job candidates on the basis of superficial attributions may have high economic costs, if they do not reflect real skills and abilities. In the case of personnel recruitment related to the healthcare context, it may also have human costs, at the expense of patients' health. In light of the current massive recruitment of COVID-19-related nursing staff (Britt et al., 2020), it becomes crucial investigating whether facial appearance of applicants in healthcare professions may influence the probability to be hired. It has been shown that decisions made during stressful and emergency conditions are more likely to be influenced by perceptual biases, such as those induced by facial appearance (Bagnis et al., 2020; Dehon et al., 2017). Indeed, during situations characterized by time pressure and clinical uncertainty people are likely to fill the gap of lacking information with prior knowledge and stereotypes (Burgess et al., 2014). The COVID-19 pandemic represents an ideal context within which to explore potential biases in healthcare. Specifically, the present ecological study aims to explore whether appearance-based judgments of new-graduates in nursing would be able to predict the probability to be hired as nurses during the 6 months following their graduation. Therefore, this study intends to broaden the literature reporting biased hiring decisions because of facial appearance of applicants, by extending the investigation into the healthcare context.

In general terms, we expected that positive trait inferences (i.e., higher in perceived trustworthiness, competence, dominance, familiarity and caring) from applicants' facial appearance would enhance the probability to be hired.

2 | METHODS

2.1 | Photographs

We recruited 90 new-graduates in nursing. All of them were Caucasian and Italian. After a brief description of the study, they were asked to fill a demographic form, and to sign an informed consent and a release note for photographic material. Also, participants were asked to provide their Italian degree mark and their telephone number. Next, we collected photos for all participants, asking for their University passport photo (i.e., a frontal and neutral face), and then we cropped and normalized each photo for size and luminance. About 6 months later, each graduate was interviewed by phone asking about their job situation (i.e., if they had a face-to-face job interview and if they were hired or not). Sixteen graduates were excluded from the study because not available when they were contacted or because they were hired not through a face-to-face interview, but after a national employment competition based on written test. The statistical analyses were therefore conducted on 74 graduates (57 women, 17 men; M = 25.23, SD = 5.42 years). All personal data and informed consent were anonymized. The study was approved by the Institutional Review Board (IRB) of the University of Bologna.

2.2 | Rating of photographs

To collect measures of facial appearance-based inferences, an independent sample of 142 participants (107 women, 35 men; M = 38.39, SD = 18.01 years) was recruited from the University community and surrounding area. They were asked to rate the photographs on perceived trustworthiness (i.e., how much he/she appeared to be capable of inspiring trust), competence (i.e., how much he/she appeared to be competent), dominance (i.e., how much he/she appeared to master the situation), familiarity (i.e., how much he/she appeared resembling someone you know), and caring (i.e., how much he/she appeared to be capable of taking care of someone). Trustworthiness and dominance were chosen based on Todorov's model (Todorov et al., 2015) while competence, caring and familiarity based on the nature of the context (Rule & Ambady, 2008; Rule & Tskhay, 2014), the act of caring (Benedetti, 2013; Ruben, 2016; Ruben, Blanch-Hartigan, & Hall, 2017) and the signals of safety (Eisenberger et al., 2011; Goldstein, Weissman-Fogel, Dumas, & Shamay-Tsoory, 2018; Loewenstein, Hsee, Weber, & Welch, 2001; von Mohr, Krahé, Beck, & Fotopoulou, 2018; Zebrowitz, Bronstad, & Lee, 2007).

Participants rated targets on all traits at once. Rating responses were collected on a Likert scale from 1 (not at all) to 9 (extremely) following a procedure similar to that of Todorov and colleagues (Engell, Haxby, & Todorov, 2007). The full-color photographs (standard size of 15 cm width × 20 cm height) of the 74 graduates were individually and randomly presented at the center of a computer screen, using E-Prime software (http://www.pstnet.com/). Each photo presentation was preceded by a central fixation cross (500 ms). There was no time limit or feedback during the task.

Each participant was instructed to report the initial "gut impressions" based on his/her first impression. To avoid the possibility that participants had already seen or interacted with the graduates, they were asked whether they had already met the person of each photo before rating task started. No participants reported that they were familiar with the depicted person. Finally, it is important to note that participants, as independent judgers, were completely blind to the

specific aim of the research and, therefore, they were not aware that they were rating new-graduates in nursing.

The ratings obtained were highly reliable (Cronbach's alpha > .92).

2.3 | Statistical analyses

Since facial ratings are often intercorrelated (Todorov, Said, Engell, & Oosterhof, 2008), variance inflation factors (VIF) were calculated to screen for multicollinearity among the facial appearance variables (i.e. trustworthiness, competence, dominance, familiarity, caring). Commonly, VIF greater than 10 are suggested for detecting multicollinearity (James, Witten, Hastie, & Tibishirani, 2013; Kutner, 2014). Here, VIFs were found to be greater than 10 for trustworthiness (VIF = 27.10), competence (VIF = 21.59) and caring (VIF = 23.80). Since our main interest was in examining the role of facial appearance in healthcare context, we decided to keep caring scores and to drop out trustworthiness and competence scores from the analysis. VIFs for the remaining variables (i.e., dominance, familiarity and caring) were found to be less than 10.

Binomial logistic regression analyses, using the enter method, were conducted to examine whether facial appearance ratings would predict the probability to be hired as a nurse. Data about new-graduates were entered in predictive models with the information about being hired (yes, not) as categorical dependent variable, while facial appearance ratings scores were entered as continuous independent variables. Also, the Italian degree mark, age and gender of the new-graduates were entered as independent variables to verify their potential confounding role. Finally, since gender has been shown to interact with inferences from facial appearance (Todorov et al., 2015), a model with interaction terms between gender and trait judgments was run. Hosmer–Lemeshow test was also calculated to assess the inferential goodness-of-fit of the models.

To sum up, models with all the predictors (i.e., trustworthiness, competence, dominance, familiarity, caring scores), models including each predictor one at a time and, finally, models with only variables with a good VIF were run.

The statistical analysis was conducted using SPSS Statistics 26 software (IBM, Armonk, NY).

3 | RESULTS

Logistic regression results showed that models with all the predictors are able to predict whether a candidate would be hired or not. Both inferential goodness-of-fit tests were not significant ($p > .05$), suggesting that the models fit the data well. A test of the first predictive model (i.e., with facial appearance ratings scores) versus a model with intercept only (i.e., the null model) was statistically significant, $\chi^2 = 16.93$, $p < .001$. The model was able to correctly classify 78% of the probability that a new-graduate would be hired or not. Specifically, it was found that higher familiarity ($\beta = 2.965$, SE = 1.282, Wald = 5.350, $p < .05$, OR = 19.39, 95% CI [1.57–239.13]), higher trustworthiness ($\beta = 4.130$, SE = 1.882, Wald = 4.815, $p < .05$, OR = 62.176, 95% CI [1.55, 2487.57]), and lower caring ($\beta = -5.527$, SE = 1.969, Wald = 7.883, $p < .01$, OR = .004, 95% CI [0.000, 0.188]) were associated with graduates who were hired as nurses after a face-to-face interview. Instead, dominance and competence scores did not reach a statistically significant level. The predictive model ($\chi^2 = 21.25$, $p < .01$) controlling for the degree mark, age and gender was able to correctly classify 86% of the probability that a new-graduate would be hired or not. The model confirmed that higher familiarity ($\beta = 2.825$, SE = 1.347, Wald = 4.398, $p < .05$, OR = 16.86, 95% CI [1.20–236.48]) and lower caring ($\beta = -5.814$, SE = 2.136, Wald = 7.409, $p < .01$, OR = .003, 95% CI [0.000, 0.196]) were associated with graduates who were hired as nurses. Degree

TABLE 1 Results of binomial logistic regression

Predictor	β	SE	Wald[a]	p	OR	95% CI
Model 1						
Constant	−0.349	2.340	.022	.881		
Dominance	0.595	0.547	1.182	.277	1.813	[0.620–5.301]
Familiarity	3.076	1.186	6.723	**.010**	21.664	[2.119–221.508]
Caring	−2.540	0.934	7.401	**.007**	.079	[0.013–0.492]
Model 2						
Constant	−9.550	6.919	1.905	.167		
Dominance	0.782	0.617	1.604	.205	2.185	[0.652–7.325]
Familiarity	2.677	1.202	4.956	**.026**	14.540	[1.377–153.488]
Caring	−2.578	1.005	6.574	**.010**	.076	[0.011–0.545]
Degree mark	0.107	0.061	3.017	.082	1.113	[0.986–1.255]
Age	−0.048	0.059	.660	.417	.953	[0.850–1.070]
Gender	−0.206	0.817	.064	.800	.813	[0.164–4.034]

Note: $N = 74$; Statistically significant p-values appear in boldface. The reference category is "Yes".
Abbreviations: CI, confidence interval; OR, odd ratio.
[a]df = 1.

mark ($\beta = 0.123$, SE $= 0.063$; Wald $= 3.736$, $p < .05$, OR $= 1.131$, 95% CI [0.998, 1.280]) were found to be a significant predictor as well. Instead, trustworthiness, competence, dominance, age and gender did not reach the significance level.

Models with interaction terms between gender and trait judgments and models including each predictor one at a time were found to be not significant.

The model with only the predictors with a good VIF (i.e., familiarity, dominance and caring scores) was found to be significant, $\chi^2 = 11.15$, $p < .01$ (see Table 1 for the logistic regression full results). The model was able to correctly classify 80% of the probability that a new-graduate would be hired or not. Specifically, it was found that higher familiarity and lower caring scores were associated with graduates who were hired as nurses after a face-to-face interview. These results suggest that, with each point on the scores, graduates who appeared more familiar and less caring were more likely to be hired rather than not. Instead, dominance scores did not reach a statistically significant level.

The predictive model ($\chi^2 = 13.95$, $p < .05$) controlling for the degree mark, age and gender, was able to correctly classify 78% of the probability that a new-graduate would be hired or not. Again, it was found that higher familiarity and lower caring scores were associated with graduates who were hired as nurses after a face-to-face interview, while degree mark, age and gender did not reach a statistically significant level, suggesting that facial appearance alone strongly biased the hiring process.

Finally, the predictive model ($\chi^2 = 16.25$, $p < .05$) was able to correctly classify 81% of the probability that a new-graduate would be hired or not, but the interaction terms between gender and facial appearance ratings scores were not significant.

4 | DISCUSSION

First impression based on facial appearance is a prominent factor that has been proven to influence several aspects of interpersonal interactions and social decisions (Todorov et al., 2015). However, although prior research has established the role of inferences from facial appearance within the workplace context (e.g., Little & Roberts, 2012; Rule & Ambady, 2008; Rule & Tskhay, 2014; Stoker, Garretsen, & Spreeuwers, 2016), no study has investigated the role of first impression in healthcare personnel' recruitment. Here, we investigated whether decisions during real face-to-face interviews to hire nurses are biased by facial appearance-based inferences of job applicant' personality and abilities.

Consistently with research indicating that facial appearance-based judgment influences real-life hiring decisions across a wide range of work context (Little & Roberts, 2012), the present findings indicate that naïve new-graduate nurses facial appearance is able to predict the probability to be hired in the healthcare system. Specifically, the more a face appears familiar, the more the likelihood of being hired increase. Instead, appearing caring seems to decrease the probability to be hired, but it is important to note that, albeit

significant, this influence is actually minimal as indicated by its very low odd ratio. Noteworthily, even after controlling for the Italian degree mark, gender and age, facial appearance still predicts the likelihood to be hired as a nurse.

From these results it is possible to suggest that job interviewers relied their decisions on an implicit preference to job applicants with facial features that evoke a feeling of familiarity. In this vein, more familiar-looking applicants (i.e. those that are average or typical/less unusual/less distinctive, Bartlett, Hurry, & Thorley, 1984) may be evaluated more positively and, therefore, get the job. This result is in line with previous studies demonstrating that physical similarity to familiar others has been found to influence the evaluation and the behavioral reactions to unknown faces (Verosky & Todorov, 2010), probably on the basis of a generalization of learned affective associations (Kraus & Chen, 2010; Zebrowitz & Montepare, 2008). Evolutionary models suggest that familiarity is intrinsically rewarding because inevitably increases positivity thanks to a form of conditioning to the repetition of no discomforting effect, associating the stimulus with relief from fear of novelty (e.g., Zajonc, 2001) and it is connected with easy and efficient processing of others (e.g., Winkielman, Schwarz, Fazendeiro, & Reber, 2003). When people have to choose between two individuals, they tend to ground their decision based on how much the person resembles people they have had a pleasant interaction with (Lewicki, 1985). Similarly, here, hiring decisions of job interviewers were influenced, at least in part, by the degree of familiarity elicited by applicants' faces.

It is somewhat surprising, especially given this context, that appearing caring seems to decrease the probability to be hired, but noteworthily, the low odd ratio suggests that its influence, although significant, is a minor matter. In a previous study (Mattarozzi et al., 2020), it has been found that patients were more satisfied after receiving care from nurses who appeared more caring. Indeed, patients, when judging healthcare professionals' skills and their satisfaction about healthcare service, tend to rely more on facial appearance, since they have limited knowledge on specific clinical competences (Ruben, 2016). Here, on the contrary, job interviewers (i.e., healthcare experts) may have relied on other indicators of looking caring. While familiar-looking is a non-context-specific trait influencing people in various situations (Verosky & Todorov, 2010), appearing caring is peculiar to healthcare and therefore may vary depending on the context expertise and the decisions to be made. Further research is required to establish the underling mechanisms by which inferences of caring from facial appearance change between healthcare experts and no-experts, such as patients or the general population, and how these changes influence behaviors and decision making of the observer.

5 | LIMITATIONS

Some limitations concerning the ecological nature of the study need to be addressed. First, our sample of graduates was not recruited following a-priori rules, as we contacted students who graduated in the last available degree session. We were not able to control how many graduates would reply in the following months and how many would

have a face-to-face job interview. Consequently, our sample was not gender balanced. However, this reflects the female predominance among nursing students and professionals (Yi & Keogh, 2016).

Also, it would have been useful to assess facial appearance-based ratings of job-interviewers, but it was not possible to contact directly them. However, it should be considered that evaluating facial appearance by independent judgers, at zero acquaintance, is a standard procedure in research on first impression. Similarly, we are aware that job interviewers and the independent judgers may be different in terms of age and gender. However, studies show very high agreement between young and elderly participants (Cortes, Laukka, Ebner, & Fischer, 2019) and between males and females (Mattarozzi, Todorov, Marzocchi, Vicari, & Russo, 2015; Oh, Dotsch, Porter, & Todorov, 2019) in social judgments of faces, showing a general high consensus among subjects in making judgments about facial appearance (e.g., Todorov et al., 2015).

6 | CONCLUSION

Implicit and unintentional facial appearance-based evaluations by job interviewers can impact on healthcare hiring decisions and the recruitment process (Linke et al., 2016; Little & Roberts, 2012; Rule & Ambady, 2008; Stoker et al., 2016). Our results confirm that hiring in healthcare context is not an exception by showing that graduates with facial traits conveying feelings of familiarity are more likely to be hired as nurses. Crucially, inferences of familiarity from facial appearance have a great impact on our daily life, guiding our responses and decisions to unknown individuals (Dotsch, Hassin, & Todorov, 2017; Zebrowitz et al., 2007) and automatically enhancing positive feelings during social interactions (Coan, Schaefer, & Davidson, 2006; Krahé, Springer, Weinman, & Fotopoulou, 2013; Mattarozzi et al., 2020).

To conclude, the present study provides the first attempt to understand the implicit dynamics underlying the recruitment of healthcare professionals. In health emergency periods, and the COVID-19 pandemic is one of that, where selection is especially restricted to face-to-face interviews in order to recruit healthcare professionals faster, recognizing these potential influences and, therefore, ensuring unbiased hiring decisions should become a key priority.

CONFLICT OF INTEREST
The authors declare no conflicts of interest.

AUTHORS CONTRIBUTION
Katia Mattarozzi, Gianandrea Pasquinelli, Ivan Rubbi and Valeria Cremonini conceived the study; Eleonora Pasi collected data under the supervision of Katia Mattarozzi; Arianna Bagnis performed statistical analysis and analyzed the data; Arianna Bagnis drafted the manuscript and Katia Mattarozzi and Paolo Maria Russo provided critical revisions; all authors have reviewed and agreed with the content and findings of the article and all have contributed substantially to its creation and revision.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the corresponding author upon reasonable request.

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